CHAPTER 3 APPENDIX

A3 - 1: Lake Information and Explanatory Codes

Appendix A3-1
Lake Information and Explanatory Codes

COLUMN HEADER	DEFINITION
LAKE NAME	the name of the waterbody as shown on USGS topographic map
TOTAL ACREAGE	size of lake at summer pool or normal seasonal levels
USGS QUADRANGLE	quadrangle where the dam or waterbody is located
LATITUDE\LONGITUDE	location of the dam by degrees, minutes, and seconds
WATERBODY SYSTEM NUMBER	a stream identification number assigned by the Division of Water
COUNTY NAME	the name of the county where the dam or lake is located
RIVER BASIN	the name of the major river basin in which the waterbody is located
SUBBASIN	the name of the waterbody that receives the discharge from the lake or reservoir

LAKE NAME	TOTAL ACRES	USGS QUADRANGLE	LATI-TUDE	LONGI-TUDE	WATERBODY SYSTEM NUMBER	COUNTY NAME	RIVER BASIN	SUBBASIN
A.J.JOLLY LAKE	204	ALEXANDRIA	38-52-59	84-22-27	21000883	CAMPBELL	LICKING	PHILLIPS CREEK
ARROWHEAD LAKE	37	CAIRO,ILL-KY	37-01-50	89-07-20	21000661	BALLARD	MISSISSIPPI	CYPRESS SLOUGH
BARREN RIVER LAKE	10000	LUCAS	36-55-34	86-02-28	21001199	BARREN\ALLEN	GREEN	BARREN RIVER
BEAVER LAKE	158	ASHBROOK	37-57-45	85-01-20	21001280	ANDERSON	SALT	BEAVER CREEK
BEAVER DAM LAKE	50	OLMSTEAD ILL-KY	37-09-04	89-02-32	21001492	BALLARD	OHIO	HUMPHREY CREEK
BERT COMBS LAKE	36	BARCREEK	37-10-00	83-42-27	21031180	CLAY	KENTUCKY	BEECH CREEK
BOLTZ LAKE	92	WILLIAMSTOWN	38-42-12	84-36-45	21002985	GRANT	KENTUCKY	ARNOLDS CREEK
BRIGGS LAKE	18	HOMER	36-53-21	86-49-49	21003348	LOGAN	GREEN	MUD RIVER
BUCK LAKE	19	BARLOW,KY-ILL	37-02-26	89-05-22	21003796	BALLARD	MISSISSIPPI	SHAWNEE CREEK
BUCKHORN LAKE	1230	BUCKHORN	37-18-16	83-26-54	21003846	PERRY\LESLIE	KENTUCKY	MIDDLE FK.KENTUCKY RIV
BULLOCK PEN LAKE	134	VERONA	38-47-36	84-38-41	21003996	GRANT	KENTUCKY	BULLOCK PEN CREEK
BURNT POND	10	BARLOW,KY-ILL	37-02-40	89-07-02	21004124	BALLARD	MISSISSIPPI	DEEP SLOUGH
CAMPBELLSVILLE CITY RES.	63	CAMPBELLSVILLE	37-21-31	85-20-17		TAYLOR	GREEN	TRACE FK, L. PITMAN CK
CAMPTON LAKE	26	CAMPTON	37-44-42	83-32-37	21004520	WOLFE	KENTUCKY	HIRAM BR, SWIFT CAMP CK
CANEYVILLE CITY RESERVOIR	75	CANEYVILLE	37-26-34	86-27-42		GRAYSON	GREEN	NF CANEY CREEK
CANNON CREEK LAKE	243	MIDDLESBORO NORTH	36-40-51	83-42-08	21004694	BELL	UPPER CUMBERLAND	CANNON CREEK
CARPENTER LAKE	64	MACEO	37-50-51	86-58-51	21004751	DAVIESS	OHIO	UT TO PUP CREEK
CARR FORK LAKE	710	VICCO	37-14-04	83-00-03	21004822	KNOTT\PERRY	KENTUCKY	CARR FORK, KENTUCKY RIV
CAVE RUN LAKE	8270	SALT LICK	38-03-03	83-29-42	21005034	ROWAN\BATH	LICKING	N\A
CHENOA LAKE	37	KAYJAY	36-40-33	83-51-07	21005361	BELL	UPPER CUMBERLAND	CLEAR CREEK
CORBIN CITY RESERVOIR	139	CORBIN	36-59-23	87-07-07		LAUREL	UPPER CUMBERLAND	LAUREL RIVER
CORINTH LAKE	96	MASON	38-30-00	84-34-56	21006394	GRANT	KENTUCKY	THREE FORKS CREEK
CRANKS CREEK LAKE	219	HUBBARD SPRINGS,VA	36-44-23	83-13-12		HARLAN	UPPER CUMBERLAND	CRANKS CREEK
DALE HOLLOW LAKE	4300	DALE HOLLOW DAM,TN	36-36-31	85-19-29	21007039	CUMBERLAND\CLINTON	UPPER CUMBERLAND	OBEY RIVER
DEWEY LAKE	1100	DEWEY LAKE	37-41-39	82-42-22	21007522	FLOYD	BIG SANDY	LEVISA FORK
DOE RUN LAKE	51	INDEPENDENCE	38-59-19	84-33-07		KENTON	LICKING	BULLOCK PEN CREEK
ELMER DAVIS LAKE	149	GRATZ	38-29-51	84-52-40		OWEN	KENTUCKY	NORTH SEVERN CREEK
ENERGY LAKE	370	MONT	36-51-30	88-01-26	21008825	TRIGG	LOWER CUMBERLAND	CROOKED CREEK
FISH LAKE	27	BARLOW,KY-ILL	37-03-00	89-05-30	21009308	BALLARD	MISSISSIPPI	SHAWNEE CREEK
FISHPOND LAKE	32	JENKINS WEST	37-09-42	83-40-38	21031271	LETCHER	KENTUCKY	FISHPOND BRANCH
FISHTRAP LAKE	1143	MILLARD	37-25-39	82-22-12	21009357	PIKE	BIG SANDY	LEVISA FORK

LAKE NAME	TOTAL ACRES	USGS QUADRANGLE	LATI-TUDE	LONGI-TUDE	WATERBODY SYSTEM NUMBER	COUNTY NAME	RIVER BASIN	SUBBASIN
FLAT LAKE	38	BARLOW,KY-ILL	37-02-30	89-05-57	21009434	BALLARD	MISSISSIPPI	UT TO SHAWNEE CREEK
FREEMAN LAKE	160	ELIZABETHTOWN	37-43-15	85-52-17	21031223	HARDIN	GREEN	FREEMAN CREEK
GENERAL BUTLER ST.PK. LAKE	29	CARROLLTON	38-40-04	85-08-54		CARROLL	KENTUCKY	UT TO KENTUCKY RIVER
GRAPEVINE LAKE	50	MADISONVILLE EAST	37-18-16	87-28-40		HOPKINS	GREEN	UT TO FLAT CREEK
GRAYSON LAKE	1512	GRAYSON	38-11-48	83-02-36	21010844	CARTER\ELLIOTT	LITTLE SANDY	N\A
GREENBRIAR LAKE	66	PRESTON	38-01-11	83-51-34		MONTGOMERY	LICKING	GREENBRIAR CREEK
GREENBO LAKE	181	ARGILLITE	38-29-19	85-52-04	21010959	GREENUP	LITTLE SANDY	CLAYLICK CREEK
GREEN RIVER LAKE	8210	CANE VALLEY	37-14-59	85-20-02	21010945	ADAIR\TAYLOR	GREEN	N\A
GUIST CREEK LAKE	317	SHELBYVILLE	38-12-28	85-08-31	21011172	SHELBY	SALT	GUIST CREEK
HAPPY HOLLOW LAKE	20	OLMSTEAD ILL-KY	37-00-28	89-01-48		BALLARD	OHIO	HUMPHREY CREEK
HEMATITE LAKE	90	MONT	36-53-44	88-02-53	21011995	TRIGG	LOWER CUMBERLAND	LONG CREEK
HERRINGTON LAKE	2940	WILMORE	37-44-45	84-42-14	21012101	MERCER\GARRARD	KENTUCKY	DIX RIVER
HONKER LAKE	190	MONT	36-54-22	88-01-47	21012645	TRIGG	LOWER CUMBERLAND	LONG CREEK
KENTUCKY LAKE	48100	GRAND RIVERS	36-29-52	88-02-42	21014338\21014339	MARSHALL\LIVINGSTON	TENNESSEE	N\A
KINCAID LAKE	183	FALMOUTH	38-42-57	84-16-36		PENDLETON	LICKING	KINCAID CREEK
KINGFISHER LAKE	30	MACEO	37-50-42	86-58-35	21014459	DAVIESS	OHIO	PUP CREEK
LAKE BARKLEY	45600	GRAND RIVERS	36-44-12	87-57-58	21001106	LIVINGSTON\LYON	LOWER CUMBERLAND	N\A
LAKE BESHEAR	760	DAWSON SPRINGS	37-08-28	87-40-57	21001890	CALDWELL\CHRISTIAN	TRADEWATER	PINEY CREEK
LAKE BLYTHE	89	KELLY	36-55-32	87-30-00	21002850	CHRISTIAN	LOWER CUMBERLAND	WHITE CREEK
LAKE CARNICO	114	CARLISLE	38-20-48	84-02-30		NICHOLAS	LICKING	BRUSHY CREEK
LAKE CUMBERLAND	50250	WOLF CREEK DAM	36-54-47	84-58-43	21006949	RUSSELL\CLINTON	UPPER CUMBERLAND	N\A
LAKE GEORGE	53	MARION	37-17-49	88-05-25		CRITTENDEN	OHIO	UT TO CROOKED CREEK
LAKE JERICHO	137	SMITHFIELD	38-27-07	85-16-56	21023710	HENRY	LITTLE KENTUCKY	N\A
LAKE LINVILLE	273	WILDIE	37-23-20	84-20-40		ROCKCASTLE	UPPER CUMBERLAND	RENFRO CREEK
LAKE MALONE	826	ROSEWOOD	37-04-19	87-02-20	21017009	MUHLENBERG	GREEN	ROCKY CREEK
LAKE MORRIS	170	KELLY	36-55-44	87-27-18	21018602	CHRISTIAN	LOWER CUMBERLAND	UPPER BRANCH, LITTLE RIV
LAKE PEWEE	360	MADISONVILLE WEST	37-21-09	87-31-40	21020953	HOPKINS	TRADEWATER	GREASY CREEK
LAKE REBA		RICHMOND NORTH	37-44-28	84-15-07	21022751	MADISON	KENTUCKY	MUDDY CREEK
LAKE WASHBURN	26	DUNDEE	37-31-05	86-50-56		OHIO	GREEN	LICK BRANCH
LAUREL CREEK LAKE	88	WHITLEY CITY	36-41-18	84-26-35		MCCREARY	UPPER CUMBERLAND	LAUREL CREEK
LAUREL RIVER LAKE	6060	SAWYER	36-58-21	84-15-31	21014927	LAUREL\WHITLEY	UPPER CUMBERLAND	LAUREL RIVER

LAKE NAME	TOTAL ACRES	USGS QUADRANGLE	LATI-TUDE	LONGI-TUDE	WATERBODY SYSTEM NUMBER	COUNTY NAME	RIVER BASIN	SUBBASIN
LEWISBURG LAKE	51	LEWISBURG	36-58-14	86-55-36		LOGAN	GREEN	AUSTIN CREEK
LIBERTY LAKE	79	LIBERTY	37-19-03	84-54-26		CASEY	GREEN	HICKMAN CREEK
LOCH MARY	135	MADISONVILLE WEST	37-16-06	87-31-22	21016154	HOPKINS	TRADEWATER	UT TO CLEAR CREEK
LONG POND	56	CAIRO,ILL-KY	37-01-15	89-07-40	21016477	BALLARD	MISSISSIPPI	CYPRESS SLOUGH
LONG RUN PARK LAKE	27	CRESTWOOD	38-16-01	85-25-05		JEFFERSON	SALT	LONG RUN
LUZERNE LAKE	55	GREENVILLE	37-12-42	87-11-54	21026847	MUHLENBERG	GREEN	UT TO CANEY CREEK
MARION COUNTY LAKE	21	LEBANON EAST	37-30-54	85-14-45		MARION	SALT	UT TO ROLLING FORK
MARTIN'S FORK LAKE	334	ROSE HILL,VA-KY	36-44-36	83-15-58		HARLAN	UPPER CUMBERLAND	MARTINS FORK
MAUZY LAKE	84	BORDLEY	37-37-08	87-51-26		UNION	OHIO	CASEY CREEK
MCNEELY LAKE	51	BROOKS	38-06-09	85-38-07	21017423	JEFFERSON	SALT	PENNSYLVANIA RUN
METCALFE COUNTY LAKE	22	EAST FORK	37-02-30	85-36-32		METCALFE	GREEN	SULPHUR CREEK
METROPOLIS LAKE	36	JOPPA,ILL-KY	37-08-52	88-46-00	21017855	MCCRACKEN	OHIO	FLOOD PLAIN LAKE
MILL CREEK L. (MONROE CO)	109	TOMPKINSVILLE	36-40-44	85-41-45		MONROE	GREEN	MILL CREEK
MILL CREEK L. (POWELL CO)	41	SLADE	37-46-07	83-40-06		POWELL	KENTUCKY	MILL CREEK
MITCHELL LAKE	58	OLMSTEAD ILL-KY	37-06-24	89-02-43	21018370	BALLARD	OHIO	HUMPHREY CREEK
MOFFIT LAKE	49	BORDLEY	37-34-41	87-51-10	21018397	UNION	TRADEWATER	DYSON CREEK
NOLIN RIVER LAKE	5790	NOLIN LAKE	37-20-10	86-10-55	21019810	EDMONSON	GREEN	NOLIN RIVER
PAINTSVILLE LAKE	1139	OIL SPRINGS	37-50-28	82-52-38	21031555	JOHNSON	BIG SANDY	LEVISA FORK
PANBOWL LAKE	98	JACKSON,QUICKSAND	37-34-30	82-22-31	21020665	BREATHITT	KENTUCKY	NF KENTUCKY RIVER
PENNYRILE LAKE	47	DAWSON SPRINGS SW	37-04-06	87-39-50	21021010	HOPKINS	TRADEWATER	CLIFTY CREEK
PROVIDENCE CITY LAKE (NEW)	35	PROVIDENCE	37-22-30	87-47-49	21022390	WEBSTER	TRADEWATER	OWENS CREEK
REFORMATORY LAKE	54	LAGRANGE	38-23-52	85-26-16	21022864	OLDHAM	OHIO	CEDAR CREEK
ROUGH RIVER LAKE	5100	MCDANIELS	37-36-40	86-29-00	21023868	GRAYSON\BRCKINRDGE	GREEN	ROUGH RIVER
SALEM LAKE	99	HODGENVILLE	37-35-29	85-42-41		LARUE	GREEN	SALEM CREEK
SANDLICK CREEK LAKE	74	BURTONVILLE	38-23-23	83-36-41		FLEMING	LICKING	SAND LICK CREEK
SCENIC LAKE	18	EVANSVILLE S,ILL-KY	37-52-42	87-33-37		HENDERSON	OHIO	UT TO OHIO RIVER
SHANTY HOLLOW LAKE	135	REEDYVILLE	37-09-02	86-23-13	21025015	WARREN	GREEN	CLAY LICK CREEK
SHELBY LAKE (SHELBY CO)	17	SHELBYVILLE	38-13-59	85-13-02	21025101	SHELBY	SALT RIVER	CLEAR CREEK
SHELBY LAKE (BALLARD CO)	24	OLMSTEAD ILL-KY	37-11-01	89-01-52	21025100	BALLARD	OHIO	GAR CREEK
SMOKEY VALLEY LAKE	36	GRAHN	38-21-59	83-07-41	21025834	CARTER	TYGARTS CREEK	SMOKEY CREEK
SPA LAKE (MUD RIVER MPS 6A)	240	SHARON GROVE	36-56-04	87-01-25		LOGAN	GREEN	WOLF LICK CREEK

LAKE NAME	TOTAL ACRES	USGS QUADRANGLE	LATI-TUDE	LONGI-TUDE	WATERBODY SYSTEM NUMBER	COUNTY NAME	RIVER BASIN	SUBBASIN
SPURLINGTON LAKE	36	SPURLINGTON	37-23-18	83-15-12	21026202	TAYLOR	GREEN	BRUSHY FK, ROBINSON CK
STANFORD CITY RESERVOIR	43	HALLS GAP	37-29-12	84-40-48	21026443	LINCOLN	KENTUCKY	NEALS CREEK
SYMPSON LAKE	184	CRAVENS	37-48-27	85-30-17	21027336	NELSON	SALT	BUFFALO CREEK
SWAN POND	193	BARLOW,KY-ILL	37-15-50	89-07-05	21027258	BALLARD	MISSISSIPPI	MINOR SLOUGH
TAYLORSVILLE LAKE	3050	TAYLORSVILLE	38-00-05	85-13-12		SPENCER	SALT	N\A
TURNER LAKE	61	OLMSTEAD,ILL-KY	37-10-22	89-02-30	21028494	BALLARD	OHIO	HUMPHREY CREEK
TYNER LAKE	87	MCKEE	37-22-09	83-54-47		JACKSON	UPPER CUMBERLAND	FLAT LICK CREEK
WILGREEN LAKE	169	RICHMOND SOUTH	37-42-44	84-20-43		MADISON	KENTUCKY	TRACE FORK,SILVER CK
WILLIAMSTOWN LAKE	300	WILLIAMSTOWN	38-40-38	84-31-15	21030071	GRANT	LICKING	SF GRASSY CREEK
WILLISBURG LAKE	126	BRUSH GROVE	37-49-32	85-09-24	21030088	WASHINGTON	SALT	LICK CREEK
WOOD CREEK LAKE	672	BERNSTADT	37-11-24	84-10-48	21030426	LAUREL	UPPER CUMBERLAND	WOOD CREEK
YATESVILLE LAKE	2242	FALLSBURG, KY-WV	38-07-27	82-42-58		LAWRENCE	BIG SANDY	BLAINE CREEK

COLUMN HEADER	DEFINITION
ASSESSMENT:	
DATE	year of the most recent assessment
CAT	CATEGORY = the type of assessment made in determining the water quality condition of the waterbody M (monitored) assessments were based on current (< 10 yrs. old) site-specific data E (evaluated) assessments were based on information other than site specific criteria
TYPE	one digit code representing the type of water quality assessment made on the waterbody: 1 = assessment based on growing season sampling regime (three times per year) 2 = assessment based on data collected over time at fixed monitoring stations 3 = assessment based on Division of Water collections 4 = assessment based on U.S.Corps of Engineers collections 5 = assessment based on Tennessee Valley Authority collections
TROPHIC STATUS	the trophic state of the waterbody at the most recent assessment
TOX MON?	Toxics Monitoring? an indication of the existence of information (Y=yes;N=no) indicating the presence or absence of toxics in the waterbody
TOXIC CODES	the type of toxics monitoring information gathered at the waterbody 1 = Organics in the water column 2 = Organics in fish tissue 3 = Pesticides in water column 4 = Pesticides in fish tissue 5 = Metals in the water column 6 = Metals in the sediment 7 = Metals in fish tissue 8 = Toxics testing of discharge
FISH CONSUMPTION:	
SUPP	no fish/shellfish advisories or bans in effect
PART	a fish/shellfish advisory or ban in effect for "restricted consumption" which limits the number of meals or amount consumed per unit time
NOT	a fish/shellfish advisory or ban with a commercial fishing/shellfishing ban in effect for "no consumption" for one or more fish species

COLUMN HEADER	DEFINITION
SWIMMABLE:	
SUPP	the number of acres which support water-based recreational activities
PART	the number of acres which partially support water-based recreational activities
NOT	the number of acres which do not support water-based recreational activities
USE SUPPORT:	Use Support Status
FULL	all uses are supported(based on data)
PART	one or more uses are partially supported and the remaining uses are fully supported
NOT	one or more uses are not being supported 1) WAH = warmwater aquatic habitat 2) CAH = coldwater aquatic habitat 3) PCR = primary contact recreation 4) SCR = secondary contact recreation 5) DWS = domestic water supply
CAUSE\SOURCE:	a code which refers to the cause and source of the impact that caused the waterbody to either not or partially support the use 1 = metals 2 = nutrients 3 = suspended solids 4 = shallow lake basin 5 = pH 6 = other inorganics 7 = priority organics 8 = low dissolved oxygen/organic enrichment A = natural B = lake fertilization C = municipal (package treatment plants) D = septic tanks E = unspecified nonpoint source F = surface mining/deep mining/abandoned lands G = agricultural nonpoint source H = animal holding and management areas I = in-place contaminants (sediments) J = industrial K = unknown

LAKE NAME	ASSESSMENT:			TROPHIC STATUS	TOX MON?	TOXIC CODES	FISH CONSUMPTION			SWIMMABLE:			USE FULLY SUPPORTED	USE PART SUPPORTED	USE NOT SUPPORTED	CAUSE/ SOURCE
	DATE	CAT	TYPE				S	PS	NS	S	PS	NS				
A.J.JOLLY LAKE	1989	M	1,3	EUTROPHIC	N		204			204			WAH,PCR,SCR,DWS			
ARROWHEAD LAKE	1989	M	1,3	EUTROPHIC	N		37			37			WAH,PCR,SCR			
BARREN RIVER LAKE	1987	M	2,4	MESOTROPHIC	N		10000			10000			WAH,PCR,SCR,DWS			
BEAVER CREEK ARM	1987	M	2,4	EUTROPHIC	N								WAH,PCR,SCR			
SKAGGS CREEK ARM	1987	M	2,4	MESOTROPHIC	N								WAH,PCR,SCR			
BEAVER LAKE	1989	M	1,3	EUTROPHIC	N		158			158			WAH,PCR,SCR			
BEAVER DAM LAKE	1991	M	1,3	HYPER-EUTROPHIC	N		50			50			WAH,PCR,SCR			
BERT COMBS LAKE	1990	M	1,3	EUTROPHIC	N		36			36			WAH,PCR,SCR,DWS			
BOLTZ LAKE	1989	M	1,3	EUTROPHIC	N		92			92			WAH,PCR,SCR			
BRIGGS LAKE	1990	M	1,3	EUTROPHIC	N		18			18			PCR,SCR		WAH	2,B
BUCK LAKE	1989	M	1,3	EUTROPHIC	N		19			19			WAH,PCR,SCR			
BUCKHORN LAKE	1989	M	2,4	OLIGOTROPHIC	Y	1,3,5,6	1230			1230			WAH,PCR,DWS	SCR		3,F
BULLOCK PEN LAKE	1989	M	1,3	EUTROPHIC	N		134			134			WAH,PCR,SCR,DWS			
BURNT POND	1989	M	1,3	EUTROPHIC	N		10			10			WAH,PCR,SCR			
CAMPBELLSVILLE CITY RES.	1989	M	1,3	EUTROPHIC	N		63			63			PCR,DWS	WAH,SCR		2,G/4,A
CAMPTON LAKE	1990	M	1,3	MESOTROPHIC	N		26			26			WAH,PCR,SCR,DWS			
CANEYVILLE CITY RESERVOIR	1990	M	1,3	EUTROPHIC	N		75			75			WAH,PCR	DWS,SCR		2,4,A
CANNON CREEK LAKE	1990	M	1,3	OLIGOTROPHIC	N		243			243			WAH,PCR,SCR,DWS			
CARPENTER LAKE	1990	M	1,3	EUTROPHIC	N		64			64			WAH,PCR,SCR			
CARR FORK LAKE	1994	M	2,4	OLIGOTROPHIC	Y	1,3,5,6	710			710			WAH,PCR	SCR		3,F
CAVE RUN LAKE	1989	M	2,4	MESOTROPHIC	Y	1,3,5,6	8270			8270			WAH,PCR SCR			
CHENOA LAKE	1990	M	1,3	MESOTROPHIC	N		37			37			WAH,PCR,SCR			
CORBIN CITY RESERVOIR	1990	M	1,3	MESOTROPHIC	N		139			139			WAH,PCR,SCR		DWS	2,C,G
CORINTH LAKE	1989	M	1,3	EUTROPHIC	N		96			96			WAH,PCR,SCR			
CRANKS CREEK LAKE	1994	M	1,3	OLIGOTROPHIC	N		219				219			WAH,PCR,SCR		5,F
DALE HOLLOW LAKE	1979	M	2,4	OLIGOTROPHIC	N		4300			4300			WAH,PCR,SCR			
DEWEY LAKE	1991	M	2,4	MESOTROPHIC	Y	1,3,5,6	1100			1100			WAH,PCR	SCR		3,F
DOE RUN LAKE	1995	M	1,3	EUTROPHIC	N		51			51			WAH,PCR,SCR			
ELMER DAVIS LAKE	1989	M	1,3	EUTROPHIC	N		149			149			WAH,PCR,SCR			
ENERGY LAKE	1989	M	1,3	EUTROPHIC	N		370			370			WAH,PCR,SCR			
FISH LAKE	1989	M	1,3	EUTROPHIC	N		27			227			WAH,PCR,SCR			

LAKE NAME	ASSESSMENT:			TROPHIC STATUS	TOX MON?	TOXIC CODES	FISH CONSUMPTION			SWIMMABLE:			USE FULLY SUPPORTED	USE PART SUPPORTED	USE NOT SUPPORTED	CAUSE/ SOURCE
	DATE	CAT	TYPE				S	PS	NS	S	PS	NS				
FISHPOND LAKE	1990	M	1,3	EUTROPHIC	N		32			32			WAH,PCR,SCR			
FISHTRAP LAKE	1992	M	2,4	MESOTROPHIC	Y	1,3,5,6	1143			1143			WAH,PCR,SCR			
FLAT LAKE	1989	M	1,3	EUTROPHIC	N		38			38			WAH,PCR,SCR			
FREEMAN LAKE	1990	M	1,3	EUTROPHIC	N		160			160			WAH,PCR,SCR			
GENERAL BUTLER ST.PK. LAKE	1989	M	1,3	EUTROPHIC	N		29			29			WAH,PCR,SCR			
GRAPEVINE LAKE	1990	M	1,3	MESOTROPHIC	N		50			50			WAH,PCR,SCR	DWS		2,K
GRAYSON LAKE	1989	M	2,4	OLIGOTROPHIC	Y	1,3,5,6	1512			1512			WAH,PCR,SCR			
GREENBRIAR LAKE	1990	M	1,3	EUTROPHIC	N		66			66			WAH,PCR,SCR,DWS			
GREENBO LAKE	1989	M	1,3	MESOTROPHIC	N		181			181			WAH,PCR,SCR			
GREEN RIVER LAKE	1990	M	2,4	MESOTROPHIC	Y	1,2,3,5,6		8210		8210			WAH,PCR,SCR,DWS			7,J
GUIST CREEK LAKE	1989	M	1,3	EUTROPHIC	N		317			317			PCR,SCR	WAH,DWS		2,G/1,A
HAPPY HOLLOW LAKE	1991	M	1,3	HYPER-EUTROPHIC	N		20			20			WAH,PCR,SCR			
HEMATITE LAKE	1989	M	1,3	MESOTROPHIC	N		90			90			WAH,PCR,SCR			
HERRINGTON LAKE	1994	M	1,3	EUTROPHIC	N		2940			2940			WAH,PCR,SCR,DWS			
HONKER LAKE	1989	M	1,3	MESOTROPHIC	N		190			190			PCR,SCR	WAH		2,A
KENTUCKY LAKE	1993	M	2,4	EUTROPHIC	Y	1,2,3,4,5,6,7	8100			8100			WAH,PCR,SCR,DWS			
KINCAID LAKE	1990	M	1,3	EUTROPHIC	N		183			183			PCR,SCR	WAH		2,K
KINGFISHER LAKE	1990	M	1,3	EUTROPHIC	N		30			30			WAH,PCR,SCR			
LAKE BARKLEY	1984	M	5	EUTROPHIC	N		45600			45600			WAH,PCR,SCR,DWS			
LAKE BESHEAR	1990	M	1,3	MESOTROPHIC	N		760			760			PCR,SCR,DWS	WAH		2,A
LAKE BLYTHE	1990	M	1,3	MESOTROPHIC	N		89			89			WAH,PCR,SCR			
LAKE CARNICO	1990	M	1,3	EUTROPHIC	N		114			114			WAH,PCR,SCR			
LAKE CUMBERLAND	1995	M	2,4	OLIGOTROPHIC	N		49108			49108			WAH,PCR,SCR,DWS			
LILY CREEK ARM	1995	M	1,3	MESOTROPHIC	N		144			144			WAH,PCR,SCR			
BEAVER CREEK ARM	1990	M	1,3	EUTROPHIC	N		742			742			WAH,PCR,SCR			
PITMAN CREEK ARM	1994	M	1,3	MESOTROPHIC	N		256			256			WAH,PCR,SCR			
LAKE GEORGE	1990	M	1,3	EUTROPHIC	N		53			53			PCR,SCR,DWS	WAH		2,G
LAKE JERICHO	1992	M	1,3	EUTROPHIC	N		137			137			PCR,SCR	WAH		2,G
LAKE LINVILLE	1990	M	1,3	MESOTROPHIC	N		273			273			WAH,PCR,SCR,DWS			
LAKE MALONE	1990	M	1,3	EUTROPHIC	N		826			826			WAH,PCR,SCR			
LAKE MORRIS	1990	M	1,3	MESOTROPHIC	N		170			170			WAH,PCR,SCR,DWS			

LAKE NAME	ASSESSMENT:			TROPHIC STATUS	TOX MON?	TOXIC CODES	FISH CONSUMPTION			SWIMMABLE:			USE FULLY SUPPORTED	USE PART SUPPORTED	USE NOT SUPPORTED	CAUSE/ SOURCE
	DATE	CAT	TYPE				S	PS	NS	S	PS	NS				
LAKE PEWEE	1990	M	1,3	MESOTROPHIC	N		360			360			WAH,PCR,SCR	DWS		2,G
LAKE REBA	1995	M	1,3	MESOTROPHIC	N		78			78			WAH,PCR,SCR			
LAKE WASHBURN	1990	M	1,3	EUTROPHIC	N		26			26			PCR,SCR	WAH		2,K
LAUREL CREEK LAKE	1990	M	1,3	MESOTROPHIC	N		88			88			WAH,PCR,SCR,DWS			
LAUREL RIVER LAKE	1994	M	2,4	OLIGOTROPHIC	N		4990			4990			WAH,PCR SCR,DWS			
MIDLAKE-LAUREL R. ARM	1994	M	2,4	MESOTROPHIC	N		754			754			WAH,PCR,SCR,DWS			
HEADWTRS-LAUREL R. ARM	1994	M	2,4	EUTROPHIC	N		316			316			WAH,PCR,SCR			
LIBERTY LAKE	1989	M	1,3	MESOTROPHIC	N		79			79			WAH,PCR,SCR,DWS			
LOCH MARY	1990	M	1,3	OLIGOTROPHIC	N		135			135			WAH,PCR,SCR		DWS	1,6,F
LONG POND	1989	M	1,3	EUTROPHIC	N		56			56			WAH,PCR,SCR			
LONG RUN PARK LAKE	1989	M	1,3	MESOTROPHIC	N		27			27			WAH,PCR,SCR			
LUZERNE LAKE	1990	M	1,3	MESOTROPHIC	N		55			55			WAH,PCR,SCR	DWS		2,K
MARION COUNTY LAKE	1989	M	1,3	EUTROPHIC	N		21			21			WAH,PCR	SCR		2,B
MARTIN'S FORK LAKE	1994	M	2,4	OLIGOTROPHIC	N		334			334			WAH,PCR,SCR			
MAUZY LAKE	1990	M	1,3	EUTROPHIC	N		84			84			PCR,SCR		WAH	2,B
MCNEELY LAKE	1993	M	1,3	EUTROPHIC	N		51			51			PCR,SCR	WAH		2,I
METCALFE COUNTY LAKE	1995	M	1,3	EUTROPHIC	N		22			22			PCR,SCR		WAH	2,G
METROPOLIS LAKE	1989	M	1,3	EUTROPHIC	N		36			36			WAH,PCR,SCR			
MILL CREEK L. (MONROE CO.)	1990	M	1,3	MESOTROPHIC	N		109			109			WAH,PCR,SCR,DWS			
MILL CREEK L. (POWELL CO.)	1990	M	1,3	MESOTROPHIC	N		41			41			WAH,PCR,SCR,DWS			
MITCHELL LAKE	1991	M	1,3	HYPER-EUTROPHIC	N		58			58			WAH,PCR,SCR			
MOFFIT LAKE	1990	M	1,3	EUTROPHIC	N		49			49			WAH,PCR,SCR			
NOLIN RIVER LAKE	1995	M	2,4	OLIGOTROPHIC	Y	1,3,5,6	5790			5790			WAH,PCR,SCR			
PAINTSVILLE LAKE	1994	M	2,4	MESOTROPHIC	Y	1,3,5,6	1139			1139			WAH,PCR,SCR			
PANBOWL LAKE	1990	M	1,3	MESOTROPHIC	N		98			98			WAH,PCR,SCR			
PENNYRILE LAKE	1991	M	1,3	EUTROPHIC	N		47			47			WAH,PCR,SCR			
PROVIDENCE CITY LAKE (NEW)	1990	M	1,3	MESOTROPHIC	N		35			35			WAH,PCR,SCR,DWS			
REFORMATORY LAKE	1995	M	1,3	EUTROPHIC	N		54			54			PCR,SCR		WAH	2,I,H
ROUGH RIVER LAKE	1995	M	2,4	MESOTROPHIC	Y	1,3,5,6	5100			5100			WAH,PCR,SCR,DWS			
SALEM LAKE	1990	M	1,3	EUTROPHIC	N		99			99			WAH,PCR,DWS	SCR		4,A
SANDLICK CREEK LAKE	1989	M	1,3	EUTROPHIC	N		74			74			PCR	WAH,SCR		2,G/4,A

LAKE NAME	ASSESSMENT:			TROPHIC STATUS	TOX MON?	TOXIC CODES	FISH CONSUMPTION			SWIMMABLE:			USE FULLY SUPPORTED	USE PART SUPPORTED	USE NOT SUPPORTED	CAUSE/ SOURCE
	DATE	CAT	TYPE				S	PS	NS	S	PS	NS				
SCENIC LAKE	1990	M	1,3	EUTROPHIC	N		18			18			PCR,SCR	WAH		2,I
SHANTY HOLLOW LAKE	1991	M	1,3	EUTROPHIC	N		135			135			WAH,PCR,SCR			
SHELBY LAKE (SHELBY CO.)	1990	M	1,3	EUTROPHIC	N		17			17			PCR,SCR	WAH		2,G,I
SHELBY LAKE (BALLARD CO.)	1991	M	1,3	EUTROPHIC	N		24			24			WAH,PCR,SCR			
SMOKEY VALLEY LAKE	1989	M	1,3	MESOTROPHIC	N		36			36			WAH,PCR,SCR			
SPA LAKE (MUD RIV. MPS 6A)	1990	M	1,3	EUTROPHIC	N		240			240			PCR,DWS	WAH,SCR		2,G/4,A
SPURLINGTON LAKE	1989	M	1,3	EUTROPHIC	N		36			36			WAH,PCR,SCR			
STANFORD CITY RESERVOIR	1989	M	1,3	OLIGOTROPHIC	N		43			43			WAH,PCR,SCR	DWS		2,A
SYMPSON LAKE	1990	M	1,3	EUTROPHIC	N		184			184			WAH,PCR,SCR,DWS			
SWAN POND	1989	M	1,3	EUTROPHIC	N		193			193			WAH,PCR,SCR			
TAYLORSVILLE LAKE	1993	M	2,4	EUTROPHIC	Y	1,3,5,6	3050			3050			PCR,SCR	WAH		2,G
TURNER LAKE	1989	M	1,3	EUTROPHIC	N		61			61			WAH,PCR,SCR			
TYNER LAKE	1990	M	1,3	MESOTROPHIC	N		87			87			WAH,PCR,SCR,DWS			
WILGREEN LAKE	1990	M	1,3	EUTROPHIC	N		169			169			PCR	WAH,SCR		2,D
WILLIAMSTOWN LAKE	1990	M	1,3	EUTROPHIC	N		300			300			WAH,PCR,SCR,DWS			
WILLISBURG LAKE	1989	M	1,3	EUTROPHIC	N		126			126			WAH,PCR,SCR,DWS			
WOOD CREEK LAKE	1989	M	1,3	MESOTROPHIC	N		672			672			WAH,PCR,SCR	DWS		2,D
YATESVILLE LAKE	1994	M	2,4	MESOTROPHIC	Y	1,3,5,6	2,242			2,242			WAH,PCR,SCR			

* 936 Acres

CHAPTER 4

WATER QUALITY ASSESSMENT OF GROUNDWATER

WATER QUALITY ASSESSMENT OF GROUNDWATER

Introduction

Kentucky's groundwater program continues to make advances to update and strengthen existing groundwater protection strategies and groundwater remediation programs. A groundwater protection regulation is being implemented to protect the groundwater of the Commonwealth through pollution prevention planning.

Programs at various state agencies and universities continue to collect groundwater data that provide water quality information on a statewide and basin-specific basis. Figure 4-1 shows the locations of nonpoint source pollution studies conducted throughout Kentucky during the past two years. Current studies have increased sampling points to better represent the water quality of the entire state. These studies will acquire new data on ambient groundwater quality. Interpretation of new and existing data will enable agencies to determine which areas are sensitive to groundwater pollution and where pollution studies and pollution prevention funding and educational programs are needed to better protect this valuable resource in the future.

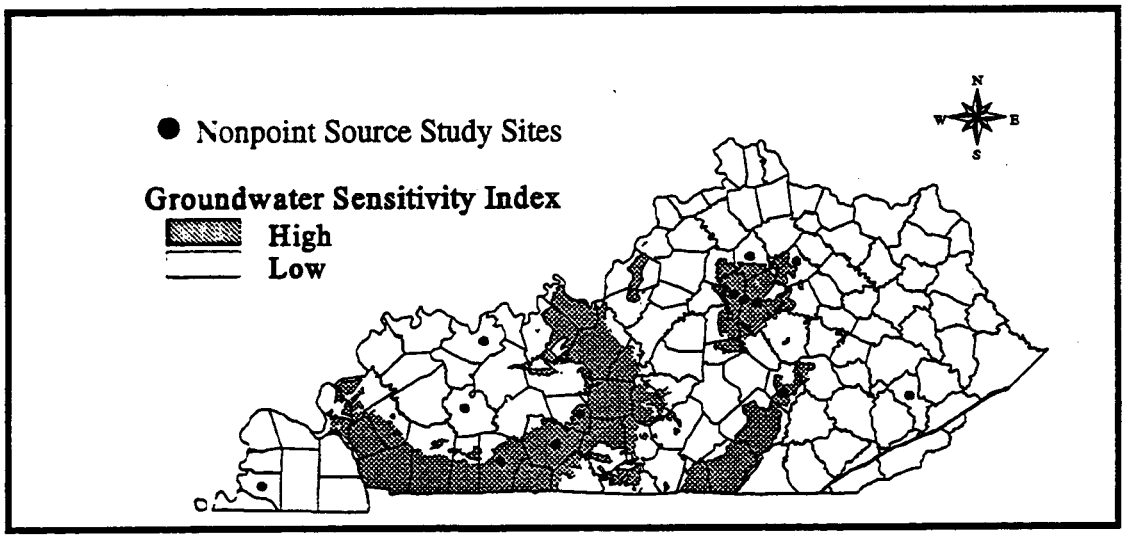

Figure 4-1. Nonpoint source groundwater quality study sites in Kentucky.

A new regulation for the protection of groundwater was promulgated by the Cabinet and approved by the Kentucky legislature. Effective August 24, 1994, 401 KAR 5:037 requires facilities whose activities have the potential to pollute groundwater to develop and implement groundwater protection plans no later than August 24, 1995. This regulation was designed to heighten people's awareness of their activities and how they can affect

groundwater as well as to reduce groundwater contamination in Kentucky by requiring best management practices to be used where activities threaten groundwater resources.

Programs of the Division of Water, Groundwater Branch, such as the Drillers' Certification Program, have become fully established over the past few years. New programs, such as the Wellhead Protection Program, have been implemented and have begun to show beneficial results. Programs and regulations of agencies other than the Division of Water (*e.g.*, the State Superfund and Hazardous Waste programs) are also continuing their efforts to protect groundwater.

Groundwater quality monitoring efforts have included, in part, public water suppliers (PWSs) that use groundwater as a water source. Approximately 435,000 Kentuckians depend on these PWSs for their domestic water source. The quality of treated groundwater available through these PWSs has not changed substantially over the past two years. MCL violations at PWSs have averaged approximately five per year in the last three years. The population affected by MCL violations dropped sharply between 1992 and 1993 when a large PWS cleaned up an MCL exceedence. This number rose slightly in 1995 due to the consolidation of several PWSs over the last four years. Consequently, as more people depend on fewer water systems, each MCL violation affects a larger population.

The information reported by the Division of Waste Management, Solid Waste Branch, has remained unchanged at approximately 10-12 sites per year reported with contamination. Three sites have contamination that has moved off-site but does not impact any public water system.

The number of federal CERCLA sites in Kentucky with groundwater contamination has not changed since 1993, but three additional sites have reported off-site contamination since 1993. None of these CERCLA sites affect public water systems.

State superfund site data show 388 active sites and 423 site closures as of December 1995. No data were available on the number of sites with off-site contamination or whether any PWSs were affected. With over 1,000 state superfund sites identified, it is thought that the number of state superfund sites in Kentucky, given the current rate of attrition and discovery, will remain at this level over the next several years.

The U.S. EPA developed a guide for states to use to identify and report contaminants (and their sources) which pose the greatest threat to groundwater quality. Kentucky's groundwater contamination problems include nonpoint source pollutants such as pesticides and fertilizers. Bacterial and nutrient pollutants are also major concerns. However, even with the current influx of data, quantification of pollutants and identification of specific pollutant sources are challenges for the future.

Regulations and statutes, such as the Groundwater Protection Regulation, the Agriculture Water Quality Act, Wellhead

Protection Program, and Drillers Certification Program reduce pollution influx to groundwater systems. They reduce the pollution influx by requiring careful consideration of activities, the use of best management practices, public education, and specific activity standards.

Overview Of State Groundwater Protection Programs

The status of the groundwater protection programs in Kentucky is shown in Table 4-1. Specific groundwater quality standards were not adopted by Kentucky. Rather, the various agencies that have programs which regulate groundwater protection follow programmatic guidelines with regard to programmatic groundwater quality standards. For example, risk-based standards are followed by the Underground Storage Tank and State Superfund programs, while RCRA and CERCLA generally adhere to MCLs or method detection limits as clean-up standards.

The EPA-endorsed CSGWPP (Comprehensive State Groundwater Protection Program) is being evaluated for possible future implementation by the State. Basic differences exist between state projections and EPA's guidance on CSGWPP. A determination as to Kentucky's intent regarding submitting a core CSGWPP will be made in 1996.

Vulnerability assessment of groundwater for drinking water and wellhead protection programs is partly addressed in the Division of Water's Groundwater Sensitivity Map, which is slated for publication in 1996. This statewide map presents, on a generalized basis, groundwater's vulnerability to contamination from activities in particular areas.

A number of valuable studies related to groundwater issues are currently being performed in Kentucky. One of these studies is a DOW 319 program investigation designed to determine the water quality of a public water supply spring. Another representative study examines the effect of a program of Best Management Practices (BMP's) and public education to change attitudes about groundwater in a karst groundwater basin in the most productive agricultural region in Kentucky.

401 KAR 5:037 - A Significant New Development In Groundwater Protection

The Division of Water promulgated a new groundwater protection regulation that became effective in August 1994. This regulation, 401 KAR 5:037, Groundwater Protection Plans, is a pollution prevention regulation that requires persons engaging in activities with the potential to pollute groundwater to develop a groundwater protection plan (GPP) for those activities. GPP's must contain general facility information, identification of all activities which must be addressed, identification of all practices developed to prevent groundwater pollution, an implementation schedule, a description of employee training, an inspection schedule, and the incorporation of other programs where applicable. While plans can be either generic or site-

Programs or Activities	Check	Implementation Status	Responsible State Agency
Active SARA Title III Program	✓	Continuing efforts	Department for Environmental Protection Commissioner's Office
Ambient groundwater monitoring	✓	Continuing efforts	Division of Water
Aquifer vulnerability assessment	✓	Completed	Division of Water
Aquifer mapping	✓	Ongoing	KGS, USGS, DOW
Aquifer characterization	✓	Ongoing	KGS, USGS, DOW
Comprehensive data management system	✓	Fully established	Division of Water
EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)	✓	Evaluating	Division of Water
Groundwater discharge permits	✓	Continuing efforts	KPDES
Groundwater Best Management Practices	✓	Fully established	Div. of Conservation, DOW
Groundwater legislation	✓	Fully implemented	Division of Water
Groundwater classification			
Groundwater quality standards			
Interagency coordination for groundwater protection initiatives	✓	Fully established	Interagency Technical Advisory Committee
Nonpoint source controls	✓	Fully established	KPDES
Pesticide State Management Plan	✓	Fully established	Division of Pesticides
Pollution Prevention Program	✓	Beginning implementation	Division of Water
Resource Conservation and Recovery Act (RCRA) Primacy	✓	Continuing efforts	Division of Waste Management
State Superfund	✓	Fully established	Division of Waste Management
State RCRA Program incorporating more stringent requirements than RCRA Primacy			
State septic system regulations	✓	Fully established	Cabinet for Human Resources
Underground storage tank installation requirements	✓	Fully established	Division of Waste Management
Underground Storage Tank Remediation Fund	✓	Fully established	PSTEAF
Underground Storage Tank Permit Program	✓	Continuing efforts	Division of Waste Managements
Underground Injection Control Program		Fully established	EPA Region IV
Vulnerability assessment for drinking water/wellhead protection	✓	Completed	Division of Water
Well abandonment regulations	✓	Continuing efforts	Division of Water
Wellhead Protection Program (EPA-approved)	✓	Fully established	Division of Water
Well installation regulations	✓	Continuing efforts	Division of Water

Table 4-1. Summary of State groundwater protection programs.

specific, generic GPPs must be approved by the Division of Water prior to implementation.

Generic plans, developed by the Division of Water, Groundwater Branch, assist those least likely to have the resources to develop site-specific plans. Four generic groundwater protection plans are currently available from the Division of Water. Those generic plans now available to the public are for residential septic systems, domestic water well owners, water well drillers, and monitoring well owners. Copies of septic system and domestic water well generic plans are available through public libraries, health departments, Division regional field offices, and Agriculture Extension offices. All four generic plans are available from the Division's central office.

Site-specific GPPs do not have to be approved before being implemented. The Division of Water will prioritize the review of site-specific GPPs, beginning with facilities in approved Wellhead Protection Plan areas, requests from DOW Field Officers, and requests from third parties. This prioritization will coordinate with the DOW's watershed approach to environmental management.

As of January 31, 1996, the Division had distributed over 22,000 informational brochures concerning implementation of this regulation. In addition, 8 generic and 39 site-specific groundwater protection plans were submitted to the Division of Water. Forty-three plans had been reviewed and seven were approved without deficiencies.

Existing Groundwater Protection Programs

Wellhead Protection Program

The 1986 amendments to the Safe Drinking Water Act require states to adopt a Wellhead Protection Program (WHPP) to protect public water supply wells and springs from contamination. Wellhead protection prevents groundwater contamination by managing potential contaminant sources within a designated land area around a well or spring. The protected areas are called Wellhead Protection Areas (WHPAs). The U.S. Environmental Protection Agency (EPA) approved Kentucky's WHPP in September 1993.

Wellhead protection in Kentucky is implemented at the local level using a five-step program:

1. Form a community planning team;
2. Delineate WHPAs for public water supply wells and springs;
3. Inventory potential sources of contamination within the WHPA;
4. Develop management strategies to control potential contaminant sources;
5. Plan for the future.

Kentucky has 362 groundwater-dependent public water suppliers (PWSs). Of these, 273 are required by 401 KAR 4:220 to develop wellhead protection plans by July, 1998. Currently, 27 PWSs which serve 200,441 Kentuckians are in various stages of the WHP preparation process (Table 4-2). Many of these PWSs

	STEP					1996			
Area Development District	1	2	3	4	5	Population Affected	# of Systems in ADD	Total Population	% Population Affected
Barren River		1	2			68,984	4	69,564	99
Big Sandy		1				230	30	6,668	3
Bluegrass		1				17,074	9	21,167	81
Buffalo Trace		1				2,634	7	15,225	17
Cumberland Valley							43	12,114	0
Five		1			1	9,075	11	12,345	74
Gateway							6	1,014	0
Green River			1			57,056	5	72,132	79
Jackson Purchase		5	1			36,050	48	114,392	32
Kentucky River		3	3			276	54	17,409	2
KIPDA							5	37,596	0
Lake Cumberland							1	5,267	0
Lincoln Trail		3				631	19	125,805	1
Northern Kentucky							17	16,843	0
Pennyrile	1	2				8,431	14	23,162	36
TOTAL	1	18	7	0	1	200,441	273	550,703	36

Table 4-2. Public Water suppliers currently in WHP preparation process.

have been assisted in their work by the Kentucky Rural Water Association. In addition, a step-by-step guidance document to assist communities and PWSs prepare a Wellhead Protection plan has been drafted by Wellhead Protection Program staff and will be available in 1996.

In addition to reviewing Wellhead Protection Plans, Groundwater Branch staff are assisting some communities with aquifer tests to determine aquifer characteristics, which are needed for WHPA delineation calculations. In conjunction with these efforts, staff members have also assisted the U.S. EPA in UIC/UST inventories in four communities in the state.

The Wellhead Protection Program staff have sponsored community workshops to assist with Wellhead Protection Plan development, developed Phase-I and Phase-II WHP submittal forms to simplify the requirements for small communities and non-transient PWSs, and coordinated Retired Senior Volunteer Program efforts to assist communities in wellhead protection field work. In addition, Groundwater Branch staff have initiated dye tracing programs to delineate the karst basins for two public water supply springs.

The Wellhead Protection Program has obtained global positioning system (GPS) equipment, which will enable efficient potential contaminant source inventories and allow electronic transfer of data to the state geographic information system (GIS). These data will then be available for use by planners, disaster and emergency personnel, and environmental professionals.

Drillers' Certification Program

The Drillers' Certification Program requires all water well and monitoring well drillers to be certified by the Division of Water. This program establishes

minimum well construction criteria to protect human health and groundwater from surface contaminants or potential contaminants in the subsurface, as well as requiring geologically and structurally sound wells be installed. Overall, the average number of certified drillers in Kentucky has remained at approximately

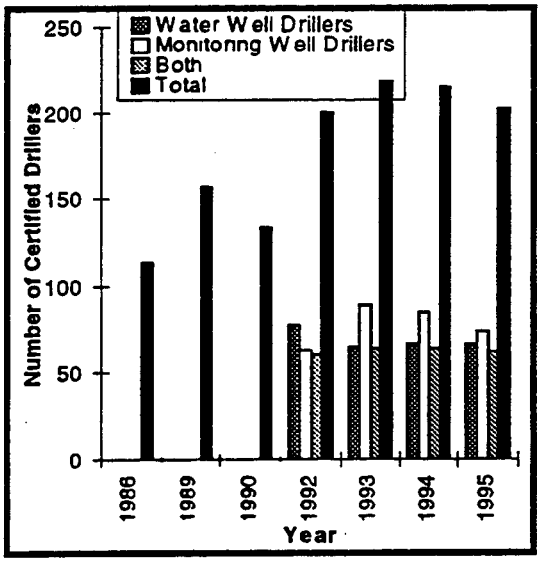

Figure 4-2. Number of drillers certified under Drillers' Certification Program.

200. Driller certifications include water well, monitoring well, and certification for both types of well drilling (Figure 4-2). The number of certified drillers is expected to remain at, or near present levels in the near future, and is only likely to change if the demand for various types of wells increases significantly for an extended period of time.

The Drillers' Certification Program provides valuable data for the Department of Environmental Protection Consolidated Groundwater Database, a database of wells and springs compiled for Kentucky. The number of water well

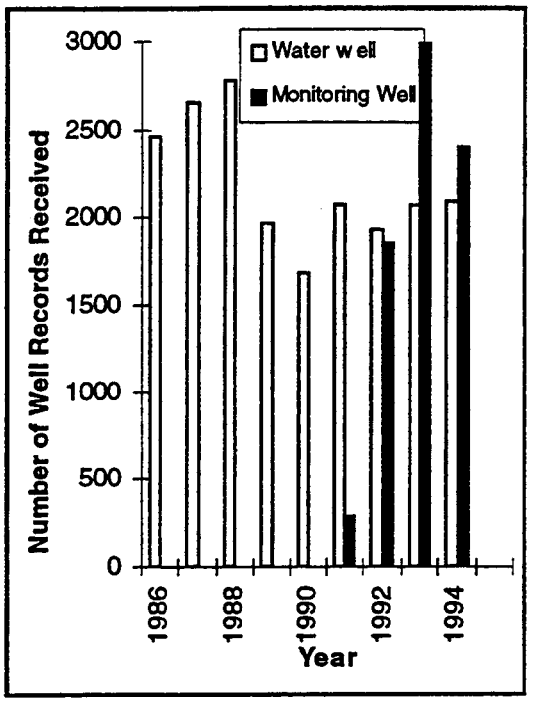

Figure 4-3. Number of well records received, 1986-1995.

records received by the program has averaged approximately 600 per quarter since the program's inception (Figure 4-3). Required submittal of monitoring well records became effective in 1991. The number of monitoring well records received since 1991, has also averaged approximately 600 per quarter.

Underground Storage Tank Program

The Underground Storage Tank Regulation Program has been in effect since 1984. As of December 31, 1995, a total of 41,795 underground storage tanks, located at approximately 14,000 facilities, have been registered with the Underground Storage Tank Branch of the Division of Waste Management. Approximately 400 of these registered sites have groundwater contamination

above MCL levels for BTEX, PAHs, and/or Oil and Grease and lead. On average, about 20 new underground storage tank sites per year manifest groundwater contamination above allowable limits. The percentage of underground storage tank sites with groundwater contamination above allowable limits (approximately 15%) did not change over the last two years.

Federal regulations which were effective December 22, 1988 require compliance by all facilities by December 22, 1998. A marked increase in the number of sites undergoing closure and corrective action is expected in the next two years. However, the percentage of sites closing that end up in long-term groundwater remediation is expected to be smaller due to the risk-based cleanup standards of the new regulations.

RCRA Programs

RCRA-D (solid waste) sites are regulated by the Division of Waste Management, Solid Waste Branch. The number of sites with contamination are shown in Figure 4-4. There are 24 reported active sites with groundwater contamination in 1995, with three locations reporting off-site contamination.

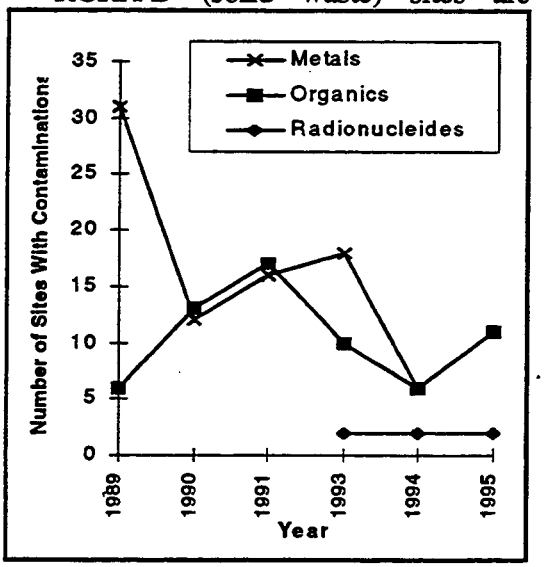

Figure 4-4. Number of RCRA-D sites with contamination 1994-1995 (incomplete).

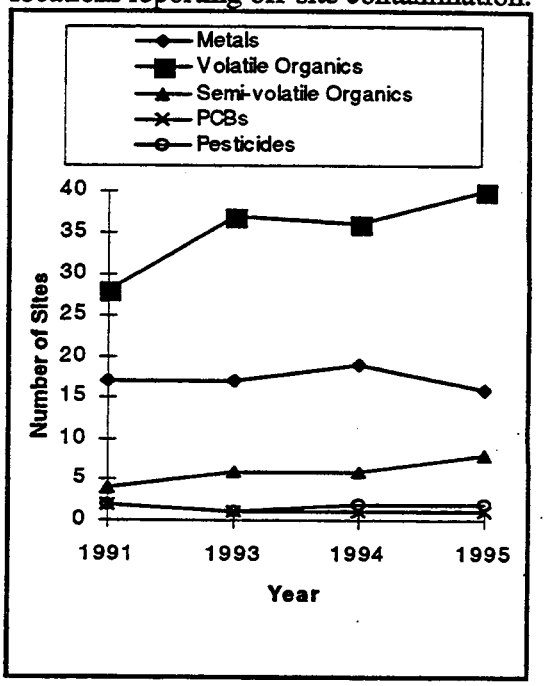

Figure 4-5. Number of RCRA-C sites with contamination 1994-1995.

RCRA-C (hazardous waste) sites in Kentucky are regulated by the Division of Waste Management, Hazardous Waste Branch. Approximately 54 sites in this program monitored groundwater during 1994-1995. Of these, 32 had confirmed groundwater contamination contained on site. Groundwater contamination extending off the property was confirmed at 11 sites.

Figure 4-5 illustrates the trends of site contamination over the last five years at RCRA-C facilities. There appears to be a general increase in the number of sites with contamination by organics, particularly volatile organics. Off-site conditions also reflect an increase in

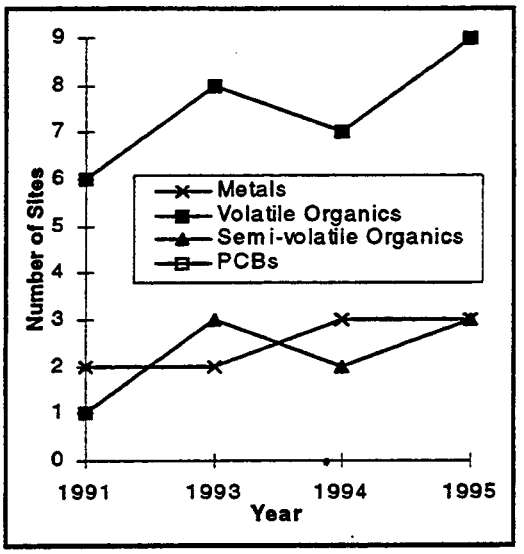

Figure 4-6. RCRA-C sites with off-site contaminations, 1991-1995.

organic contamination over the past five years (Figure 4-6). It is difficult to ascertain without further study whether this increase indicates higher off-site organic contamination or more accurate assessments.

Superfund Program

The Kentucky General Assembly passed House Bill 540 in the 1992 regular session to establish release reporting and cleanup requirements for the state. A computer-based tracking and inventory system was initiated in 1993 in compliance with HB 540. Subsequent data on all sites received has been entered into this system. A ranking and priority instrument was implemented in 1994, also to comply with HB 540. All sites evaluated, but rejected, by U.S. EPA for federal funding have been put through this state ranking instrument for funding prioritization.

The approximate number of sites reported to date is 1,957 (1,032 to EPA, 925 to Kentucky). Currently, there are 388 active sites, 423 sites closed as "in compliance," and 115 "non-incidentals" have been investigated. $3.2 million have been expended in remedial and emergency cleanups over the past 2 years.

For 1994/1995 combined, 6 of the top 12 priority sites were completed; 4 of the 12 are at remedy selection stage; and 2 are still under study. All $2.1 million remediation funds budgeted for FY 95 were allocated and/or expended.

The number of federal CERCLA sites with groundwater contamination has remained unchanged at 18 since 1993, when many CERCLA sites became State Superfund sites. However, the number of federal superfund sites with off-site contamination has risen by four to a total of 11 since 1993 (Figure 4-7).

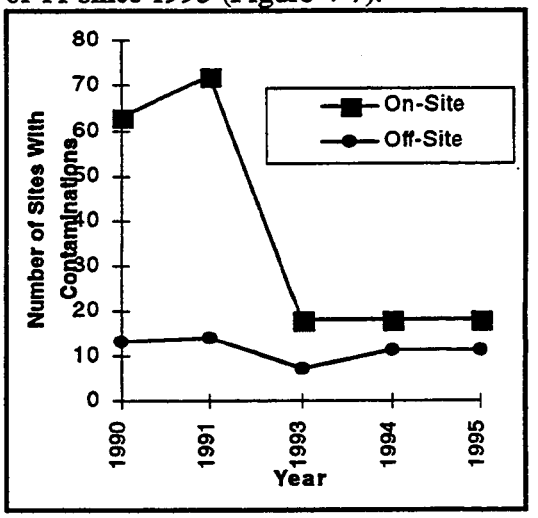

Figure 4-7. Federal CERCLA sites with groundwater contamination, 1990-1995.

The number of superfund sites in remediation (especially state superfund sites) is expected to increase slowly over the next five to ten years. Growth will be limited by the amount of funding received,

as site clean-up is expensive.

Personnel limits will also be a factor. Currently the Superfund Branch has eight staff members to oversee 388 site investigations. While some sites are contracted to private firms, the Superfund Branch must still oversee their operation.

Groundwater Usage

Groundwater usage is difficult to determine in Kentucky because so many Kentuckians use well water without any gauge of how much water they use per day. For example, approximately 500,000 Kentuckians (14%) rely on private groundwater supplies. Calculating an average daily usage of 75 gallons per day per person supplied by private and semi-private well water yields an estimated 37.5 million gallons per day of groundwater utilized by this segment of the nonregulated users in the state.

In addition, unknown quantities of groundwater are withdrawn by many nonpermitted users. These nonpermitted users, who generally withdraw less than 10,000 gallons per day, include agricultural facilities, power plants, coal mines, public water suppliers and small industries. Also included as nonpermitted users are large agricultural operations and steam-generated power plants who withdraw over 10,000 gpd but are exempt by law from obtaining withdrawal permits.

Large groundwater withdrawers are monitored. Any withdrawals of more than 10,000 gallons per day require a permit from the Division of Water. Reporting the average daily and monthly volumes withdrawn is part of the requirement for the permit which allows the Kentucky Division of Water to determine groundwater usage per year. The total volume withdrawn by permitted "large" users has increased from approximately 37.8 million gallons per day in 1980 to 320 million gallons per day in 1995 (Figure 4-8). The total volume of groundwater withdrawn by these facilities rose from approximately 57 billion gallons

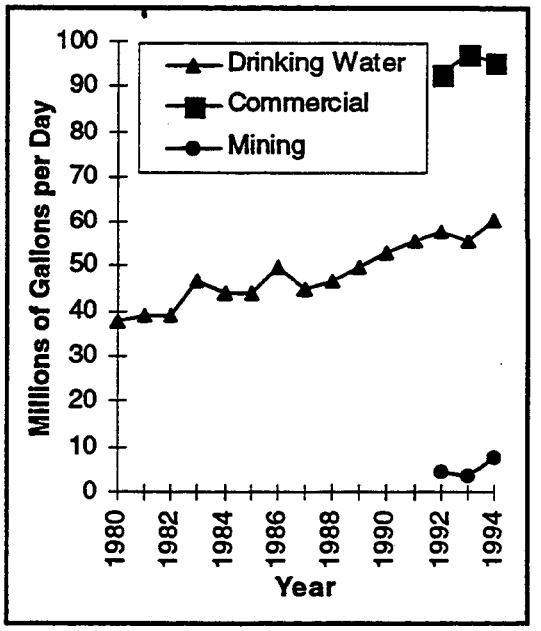

Figure 4-8. Volume of groundwater withdrawn, by category, since 1980.

per year for 1993 to approximately 59.7 billion gallons per year for 1994.

Summary Of Groundwater Quality

Public Water Supplies (PWS)

There were 362 public water suppliers using groundwater as principal, partial or supplemental supplies in 1994 and 1995. Eight (2%)

systems experienced finished water MCL violations in each of these years (Figure 4-9). The most common finished water violation in prior years has been excessive bacterial counts, with a peak of 33 reported in 1989. Four bacterial MCL violations occurred in 1994 and seven occurred in 1995.

Since 1991, nitrate and metal MCL violations have increased (Figure 4-9). In 1994, five nitrate MCL violations occurred and three developed in 1995. The number of metal MCL violations fluctuated, with five MCL violations in 1994 and two in 1995.

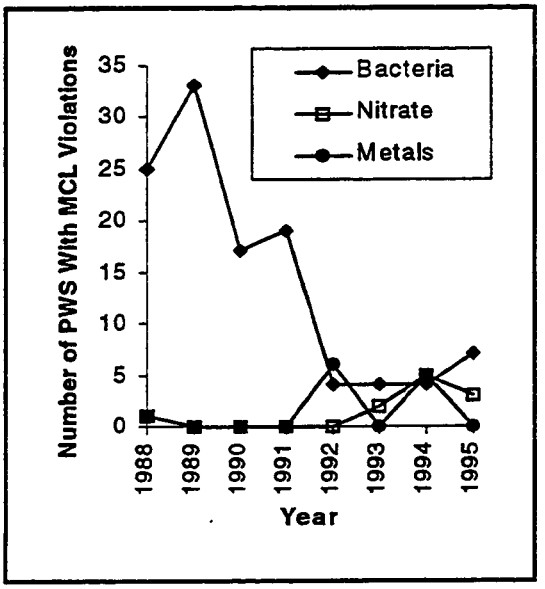

Figure 4-9. Community Public Water Suppliers with MCL violations.

The population at risk from contamination by these MCL violations dropped from 32,410 in 1992 to 3,610 in 1993. This dramatic decrease in population affected occurred when one of the largest single public water suppliers cleaned up an MCL exceedence in 1992. The population affected by MCL violations for 1995 was 9,087, with the largest portion being affected by bacterial MCL violations.

Monitoring Groundwater Quality

Senate Bill 271, an act relating to agricultural chemical usage, brought together the University of Kentucky College of Agriculture, the Kentucky Geological Survey, and the Kentucky Water Resources Research Institute to jointly conduct a study of agricultural effects on groundwater. Eleven potential highly vulnerable sites were selected.

Seven of the eleven sites were selected for detailed study (Figure 4-10); four in karst-dominated carbonate terrains and three in areas of alluvial and continental deposits.

Land-use, geology, and topography were determined for each site, and groundwater samples were taken. In addition, soils were mapped and cropping practices were determined for each area. The result of this three-year study has been the compilation of a database of ambient groundwater quality in areas that are considered to be highly vulnerable to groundwater contamination. Using these results, groundwater basins may be targeted for further study or pollution prevention, such as 319 (nonpoint source) projects.

The Division of Water's Groundwater Branch began an ambient groundwater quality monitoring project in 1995. Approximately 70 water-well and spring

sites are sampled and analyzed quarterly (Figure 4-11). Of these, 60 sites are dedicated sampling sites; ten sites are selected as variable sampling points. This is done to provide better statewide representation of Kentucky's diverse geologic and hydrogeologic framework.

nitrates. The pesticides detected include metribuzin, metolachlor, malathion, diazinon, atrazine, and permethrin.

A breakdown of wells and springs with nitrate detections showed that 19% of the wells tested had nitrates in excess of

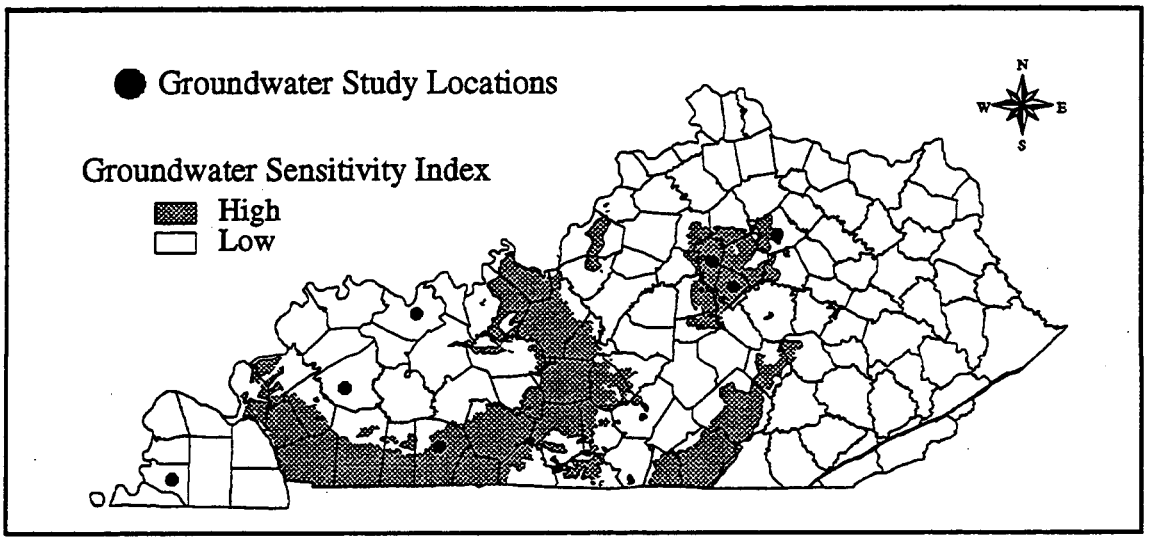

Figure 4-10. Kentucky Senate Bill 271 (1990) study sites selected for detailed studies.

Many of the wells and springs used in this monitoring network serve as public and private water supplies. These ambient monitoring sites are sampled for parameters which include nutrients, pesticides, herbicides, total dissolved solids, total suspended solids, biologic oxygen demand, pH, conductivity, and alkalinity. Due to holding time restrictions, bacterial analyses were not included in this sampling program.

Of the 69 raw groundwater analyses conducted to date, 23 had nitrate levels above 10 mg/l (the MCL for nitrate); 19 showed pesticide levels above the MCL for one or more pesticides, and 9 sites had exceeded MCL's for both pesticides and

10 mg/l, while 39.5 percent of the springs had nitrate in excess of 10 mg/l. Pesticide levels above MCL's were detected in only 2 well analyses. However, 39.5 percent of the springs showed elevated levels of pesticides. Both nitrate and pesticide detections above MCLs occurred in 3% of wells tested. Elevated levels of both nitrate and pesticides were detected in 21% of the springs tested.

These statistics reflect data gathered over three quarters in 1995. It is especially noteworthy that one site exceeded the MCL for nitrate three times and 8 sites exceeded the MCL for nitrate twice. Metribuzin MCLs were also

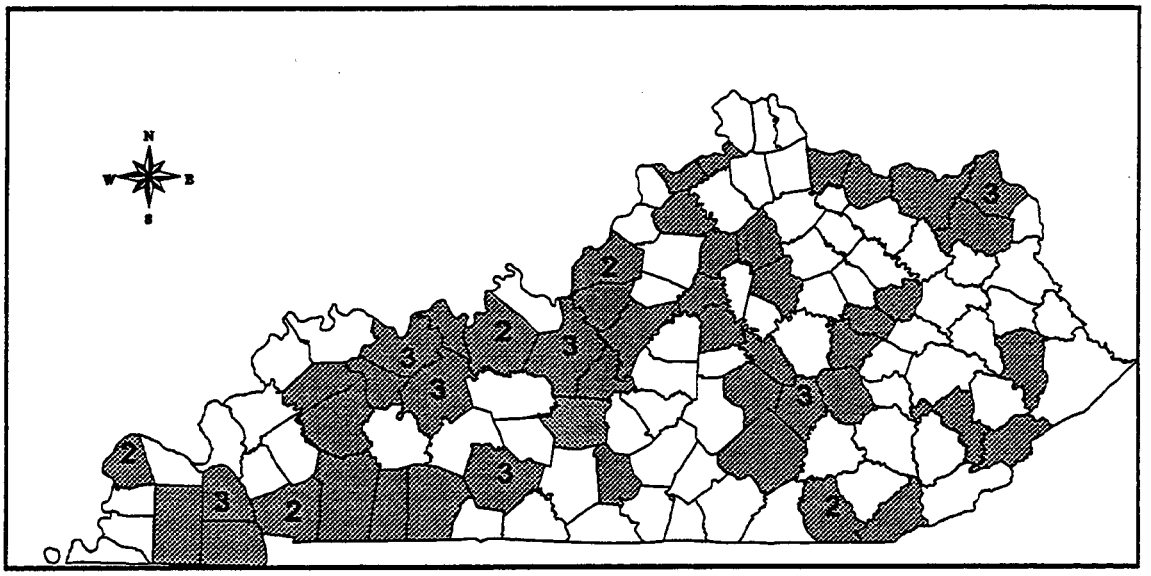

Figure 4-11. Distribution of groundwater monitoring sites in Kentucky. Numbers within shaded counties is the number of sites within that county. Numberless shaded counties have 1 site within the county.

exceeded twice at one site.

Data gathered from this study will enhance the knowledge of Kentucky's ambient groundwater quality. The results will be used to target those groundwater basins that may need further study and to focus future pollution prevention projects such as 319 BMP projects.